

CLAIMS

- 5 1. A memory device for multi-level recording comprising:
a substrate; and
a memory material supported by the substrate, the memory material including a
phase change alloy defined by: $\text{In}_x(\text{Sb}_n\text{Te}_{100-n})_{100-x}$ where x is 3-30, n is 63-82.
- 10 2. The device of claim 1, wherein x is 5-15.
3. The device of claim 1, wherein x is 7-15.
4. The device of claim 1, wherein x is 9-13.
- 15 5. The device of claim 1, wherein the phase change alloy is $\text{In}_9(\text{Sb}_{72}\text{Te}_{28})_{91}$.
6. The device of claim 1, wherein the phase change alloy is $\text{In}_{10}(\text{Sb}_{72}\text{Te}_{28})_{90}$.
7. The device of claim 1, wherein the phase change alloy is $\text{In}_{11}(\text{Sb}_{72}\text{Te}_{28})_{89}$.
- 20 8. The device of claim 1, wherein the phase change alloy has a peak with a
substantial FWHM at around $2\theta = 24-26$ degrees of X-ray diffraction using $\text{CuK}\alpha$.
- 25 9. An optical memory device for multi-level recording comprising:
a substrate; and
a phase change alloy supported on the substrate, the phase change alloy lacking
silver and having a eutectic base alloy composition with at least one element for providing
a sigma-to-dynamic range of less than 2%.

10. The device of claim 9, wherein the phase change alloy has a peak with a substantial FWHM at around $2\theta = 24-26$ degrees of X-ray diffraction using $\text{CuK}\alpha$.

11. The device of claim 9, wherein the alloy has at least two phases during data recording, one phase being a major phase and the other phase being a minor phase.

12. The device of claim 10, wherein the device is an optical memory disk.

13. The device of claim 10, wherein the alloy has 7 or more detectable levels.

14. The device of claim 10, wherein the alloy has at least 11 detectable levels.

15. The device of claim 11, wherein the memory material comprises a phase change alloy defined by: $\text{M}_x(\text{Sb}_n\text{Te}_{100-n})_{100-x}$ where x is 3-30, n is 63-82, where M is at least one main group metal.

16. The device of claim 15, wherein x is 5-15.

17. The device of claim 15, wherein x is 7-15.

18. The device of claim 15, wherein x is 9-13.

19. The device of claim 11, wherein the FWHM at around $2\theta = 24-26$ degrees of X-ray diffraction using $\text{CuK}\alpha$ is greater than that of $\text{AgIn}(\text{SbTe})$ at a corresponding concentration for M .